FUELING THE FOREST

FOR PRESENTATION TO THE 10TH ANNIVERSARY OF THE
INTERNATIONAL COUNCIL FOR RESEARCH IN AGROFORESTRY - 7-11 SEPT. 1987

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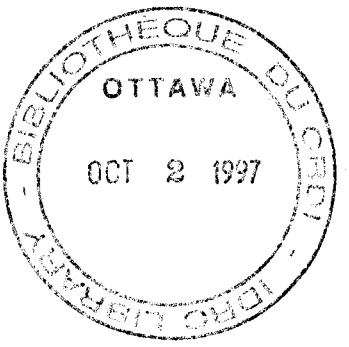

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BIRTH, BAPTISM AND BEGINNING

Speaking as one who witnessed the conception, gestation, delivery and baptism of the infant ICRAF, it is with satisfaction and pleasure that I welcome this hardy perennial to its coming of teenage.

Though ICRAF was not born into totally abject poverty, it came into the world with little expectation of an opulent lifestyle. Through its earliest years it survived on modest support from a small handful of donors. It is therefore gratifying to read in the most recent Progress Report that seven donors have committed some $2.2 M to core support and nine donors promise an additional $2.1 M for restricted core activities.

Among his many profound and wise observations Confucius had the following to say: "If you wish to govern successfully, the first thing needed is the definition of terms. If terms are ill-defined, statements disagree with facts and business is mismanaged; when business is mismanaged order and harmony do not flourish; when order and harmony do not flourish then justice becomes arbitrary; when justice becomes arbitrary the people do not know how to act, how to move hand or foot."

The views expressed in this paper are those of the author and not necessarily of the Internatiional Development Research Centre.

Logan Pearsall Smith suggested that "our names are labels, plainly printed on the bottled essence of our past behaviour". In common with most new parents, ICRAF's founding fathers debated for some time before choosing a proper name, indeed before defining exactly the new infant's purpose and how it could best be described. Some favoured "Agri-silviculture", others "Agro-silviculture", one or two opted for "Agro-silvi-pastoral culture", others argued for "Agri-forestry". I believe it was Dr. Kenneth King, that exceptionally eloquent exponent of elegant English who convinced us that "Agroforestry" was le mot juste.

The first grant made by IDRC was to the International Support Unit for Agroforestry. The proposal described the purpose as being "to disseminate hard facts on production systems combining trees, agricultural crops and animals". The Unit's resources would be channelled into "fact finding and to facilitating cooperation between agencies conducting research into agroforestry". The second and all subsequent grants were to the International Council for Research in Agroforestry.

The initial emphasis upon information gathering and dissemination probably had its origins in a series of meetings of senior African foresters who invited IDRC to establish and support an African bureau of forestry, a service that would assist the exchange of information among national forestry research, development and management units

throughout Africa. IDRC responded early in 1976 by setting up a small unit here in Nairobi consisting of two foresters whose responsibility was "to provide information and technical guidance for the afforestation of marginal lands, shelter belt establishment, species selection, plantation techniques and soil protection". This unit continued its information service to African foresters for several years, distributing a regular newsletter and other publications. It became essentially redundant as ICRAF's more comprehensive facilities were established.

ICRAF's first Board of Trustees was not satisfied to restrict the Council's activities to an information and advisory service. It insisted that for ICRAF to survive and succeed it must itself sponsor and conduct research. It was particularly emphasized that ICRAF dedicate its intellectual and material resources to the elaboration of agroforestry research methodologies and, in cooperation with other agencies to stimulate the adoption of reliable methodologies as a means to more efficient and conservative use of terrestrial resources. That ICRAF has followed this directive and continues effectively to do so is a matter of record, recognized and respected by all who have been associated with the Council. The Director and his staff are to be heartily congratulated upon the remarkable progress the Council has made in recent years.

Additional to its program of record, but less exactly quantifiable, is ICRAF's inspiration and incitement to governments and donors to pay more attention to forestry in general and to agroforestry in particular. Those of us who have supported forestry research over many years welcome the publicity and enhanced reputability which ICRAF's activities have engendered.

RESOURCE MANAGEMENT

Statistics of forest depletion and degradation are now a common feature of reports of international commissions on economic development and security. Many remind us that tropical forests equivalent in hectarage to half the area of the United Kingdom are destroyed every year; that less than half the area of tropical forests that existed at the beginning of this century still remains; that of the remaining forested area 1.5% is deforested annually.

The forest resource is among the least valued by economists and politicians alike, a puny proportion of the wood used for fuel and rural construction is either costed or enters into national income and resource accounts. Strategic planning of sustainable systems appears woefully neglected and income and employment opportunities sadly underestimated. Canada, whose economy is deeply dependent upon forest industries, displays a dismal lack of concern for conservation of this

vital natural resource. Between 1975 and 1982 approximately 6.3 M hectares of Canadian forest were harvested. Over the same period, less than 1.2 M hectares were replanted. At the same time, in addition to deliberate harvesting, roughly 19 M hectares of Canadian forest were destroyed by fire. The area damaged by pests such as the Spruce Budworm was extensive but not easily quantified.

Canadian silviculture

Not only is man destroying the forest with axe and saw. Air and soil pollution from factories and automobiles are reducing the resistance to infection among many species of maple, ash, birch, hickory and other Canadian hardwoods. Many are dying a slow death. The propagation and plantation of more resistant species is as necessary as a war against pollution.

Canadian research scientists are examining the susceptibility of rejuvenation of explants from various species. Though most attention is given to conifers, the production of haploids from anther culture in poplars is of particular interest. A recent (1987) publication by Martinus Nijhoft Publishers "Cell and Tissue Culture in Forestry" lists 56 papers that describe varying degrees of success with embryo and ovule culture in forest tree species.

A recent paper put out by the Government of Ontario Tree Improvement and Forest Biomass Institute emphasizes the importance of genetic improvement in future forest management. Though, in the past, conventional methods of selection, breeding and progeny testing have contributed profitably to Canadian forestry, micropropagation through cell, tissue and organ culture, the eventual transfer of genes, and the production of isogenic pure lines promise future hope of cloning pathogen-free and resistant trees.

While progress in ovule culture and *in vitro* pollination and fertilization of tree species is less noteworthy than in various annual crops, there is hope that eventually these techniques will give rise to seeds unobtainable *in vivo*. It is hoped however that the experience with other crops will make possible ovule culture and embryo rescue in a range of tree species. In Canada, and elsewhere, embryo inviability has been a barrier to crossing and hybridization among species of pine, Douglas-fir and spruce. Research to isolate early embryos is intended to avert early collapse and seed lethality caused by endosperm abortion.

Some progress is reported on somatic embryogenesis in liquid suspension or solid media of several species of alder (*Biota orientalis*), English holly (*Ilex spp*), and rubber trees (*Hevea brasiliensis*). *In vitro* propagation of forest trees is still at an early stage of development, though a considerable increased investment

of effort is evident over the past 10 years. Progress can now be seen in induced rooting of adventitious shoots from both hardwoods and conifers. The progress made in potato and other root crops in producing disease-free cultivars from meristem culture offers encouragement to forest research workers seeking similar objectives.

Conventional breeding has made some, although not spectacular, progress in generating disease-resistant genotypes. Modest encouragement may be derived from suspended cultures in media containing filtrates from specific pathogens. Resistant calli are selected for plant regeneration.

Isogenic pure lines are not attainable through sexual reproduction and inbreeding to produce homozygosity requires too many generations of inbreeding. Some success in generating haploid plantlets from both angiosperms and gymnosperms is reported by forest research workers in Canada.

POLICY AND PUBLIC OPINION

Only very recently has it begun to dawn upon Canadians, particularly upon Canadian journalists, that economic development depends upon environmental protection. Our environment is our inherited wealth; our most valuable riches are the earth's resources.

When we despoil forests for their timber we deplete the soil and cause it to erode. Eroded and depleted soil debases our agricultural potential. A debased agriculture exacerbates poverty, hunger and malnutrition, particularly among the poorest nations, and threatens the future economic prosperity of even the richer countries. As the environment is degraded and polluted the whole world is increasingly impoverished. Mankind has yet to learn and to live by the knowledge that air, water, forests and other natural resources are not free for all. They are vital and valuable; their depredation bears a high price that we and all future generations will some day have to pay.

Those of us who were privileged to be members of the Brundtland Commission's Advisory Panel on Food Security, Agriculture, Forestry and the Environment were at pains to emphasize that food security depends upon a sustainable and productive resource base; that forests and their ecosystems constitute a fundamental factor of stability. Their destruction can exert serious long term effects on the biosphere, the ecology and on the human, animal and plant life they support. Indiscriminate removal of vegetative cover may well contribute to the increasing frequency of drought conditions over much of Africa.

The causes of deforestation in the Third World are many and complex. They include the heavy and ever growing demand for fuelwood as populations increase; unregulated expansion of agriculture and

livestock production; uncontrolled timber exploitation and in almost all nations, an utter lack of any policy framework governing land use and forest management. In various areas of Africa, Asia and Latin America shifting cultivation inflicts greater damage to forest resources than the harvesting of wood for fuel. Deforestation and the consequent destabilization of upland watersheds causes both serious flooding and soil erosion. Regrettably, disaster and degradation consequent upon deforestation are most recognized retrospectively and in hindsight, often too late for preventive action.

Afforestation, reforestation and forest management are all severely hampered by inadequate investment in and facilities for research: research to determine land capacity and conservative land utilization; research on tree genetics, breeding and silviculture; research on alternative agroforestry systems. Perhaps the neglect is in part psychological, a sense that only foresters who have inherited Methusaleh's genes will live to see the benefits of their labours. Perhaps, subconsciously, we share Joyce Kilmer and Oscar Rasbach's belief that only God can make a tree and therefore man's plant breeding genius is better devoted to rice, wheat, oats and barley.

Support for forestry research was included in IDRC's Agriculture, Food and Nutrition Program from its earliest inception. Gilles Lessard, who led the forestry program for most of the 16 years, had to work much harder than his Crop Science colleagues to find

willing and able recipients. It is an immense credit to Gilles Lessard and his colleagues that the Centre has supported roughly 150 projects since the program started early in 1972. It is noteworthy that during the first 10 years most forestry projects were in Africa where trained forestry research scientists are indeed a rare breed. In almost all countries University departments of forestry are far fewer than departments of agriculture. Among the former French colonies of West Africa there is not a single university department of forestry. Notwithstanding that, in value, exports of forest products from Canada significantly exceed agricultural exports, within Canadian universities there are 12 faculties of agriculture and 7 faculties of forestry.

Despite this litany of woe, one must be encouraged by the sense of dedication evident in the "Strategy Meeting on Tropical Forests" held in early July at Bellagio sponsored by several international agencies, the World Resources Institute, and the Rockefeller Foundation. In its final statement the assembled group of donors pointed to the rate of forest destruction and to the fact that developing countries' imports of forest products exceed $10 B annually. Specifically discussed was support for the Tropical Forest Action Plan (TFAP) which it is proposed should double from $500 M in 1984 to $1.0 B in 1988. The Action Plan emphasises the economic and

social costs of inaction; the need for governments to prescribe policies and strategies for conservation and sustainable resource management; that the wealthier nations must invest more in protecting and less in destroying tropical forests and other natural ecosystems. The meeting specifically recommended the strengthening of research, and examination of the feasibility of creating a Consultative Group for International Forestry (CGIF) comparable in scope and purpose to the CGIAR. An international task force will prepare recommendations for financial support, policy and institutional initiatives towards this end.

DONORS AND THEIR SUPPORT

In preparing this presentation the advice and assistance of other donor agencies was canvassed. Several generously took time and trouble to record past and present priorities and programs of support for forestry in the Third World. The volume of literature far exceeds the limits of this paper and therefore the responses as received are now lodged with ICRAF's librarian.

CANADA

Canada's support for forestry is channelled mainly through CIDA, IDRC and a number of NGOs. In addition, the Canadian Forestry Service (CFS) maintains international technical liaisons which include

the International Union of Forestry Research Organizations (IUFRO) and the North American Forestry Commission.

CIDA's program

Over the past 20 years CIDA has invested more than $650 M in forestry, roughly 60% to projects related to sustainable production, 40% to effective extraction, processing and use of forest products. The present CIDA allocation to forestry is roughly $70 M, approximately 32% being devoted to institutional support, 31% to industrial forestry, 20% to forest and land use management, and 14% to wood for energy.

CIDA's support for forestry has increased at about 10% per annum since it began in 1968, a rate of annual growth expected to continue well into the next decade. Recent policy statements suggest that highest sectoral priority will be assigned to: (1) rural forestry and watershed management; (2) wood and energy; (3) conservation of tropical systems; and (4) education and training. Somewhat lower rates of increased investment in industrial forestry are expected.

In light of the recommendations recorded in a recent report of the Canadian Parliamentary Committee on External Affairs and Aid, particular emphasis will be given to human resource development. Given the comparative scarcity of people employed in strategic

planning, in resource management and in virtually all facets of research related to forestry, additional attention to and stimulation of human resource development is indeed timely.

In addition to its support for ICRAF and other international programs, in its global perspective CIDA is a prominent participant in the newly created "Tropical Forest Action Plan" (TFAP) which seeks to coordinate forestry assistance programs most effectively in:

- Land use management;
- Industrial development;
- Energy application;
- Conservation;
- Institutional improvement.

One of the useful products of the TFAP is a compendium that briefly describes forestry projects in about 113 countries and with several regional organizations, reported and supported by some 23 multilateral and bilateral donor agencies. Unfortunately the publication gives no indication of total value of annual investment either by donor or recipient. Furthermore, several of the countries listed would not be conventionally classified as tropical. A complementary TFAP publication suggests that present annual bilateral and multilateral donor investment in forestry projects in 53 tropical countries amounts to about $800 M. The same publication estimates requirements in these same countries at $8 B over the next five years.

IDRC's program

In 1970, the year that IDRC came into existence, it was calculated that in the Maghreb countries of North Africa approximately 100,000 hectares of land were turning into desert because of deforestation and over-grazing. We were also aware that of the estimated 3 B cubic metres of wood harvested in Africa, at least 90% was consumed as firewood and charcoal and that of the area classified as forest, over 97% consisted of various types of bush cover, less than 3% being classed as dense forest.

Having earlier worked with people in the Sahelian countries, it was evident that their inhabitants were among the most stressed and at greatest risk. It was therefore agreed and approved by IDRC's Board of Governors at its first meeting, that IDRC's first priority would be for the semi-arid tropics of Africa. This decision was taken in 1971 before the devastating droughts of the mid-1970s drew the world's attention to the precarious state in which Sahelian people exist.

An early survey revealed that rural women in the Sahel devote 10 hours of their daily labours to fetching fuelwood and water, and to pounding grain. In consequence, over the past 15 years throughout semi-arid Africa IDRC has given significant support to social forestry, to the development of handpumps, and to research on rural grain milling. During its first 10 years, close to 30% of all IDRC's

forestry projects were in semi-arid Africa. Up to the end of 1976, of a total of 23 social forestry projects supported, 15 were in semi-arid Africa and two others in the Middle East.

The pattern of growth in IDRC's forestry program is illustrated by the fact that during 1974 the Centre approved six projects at a total cost of $1.1 M equivalent, an average of $176,000/project. In 1986 21 projects were approved at a total cost of $3.9 M, an average of $188,000/project. It is interesting that in constant dollars the average cost per project in 1986 was considerably less than in 1974.

Indicative of the need for long term commitments to forestry projects, one of the first projects approved by IDRC in 1972 was in Senegal for the silviculture of Acacia senegal to produce Gum Arabic. Late in 1986 IDRC's Board approved a pastoral forestry management project, also at Mbidi in Senegal, to test an integrated management system associating food crops and the production of Acacia senegal and Acacia raddiana for gum and fodder.

In recent years the IDRC program has spread and diversified over all developing continents, program specialists in forestry research being now based in Singapore for Southeast Asia, Delhi for South Asia, Nairobi for eastern and southern Africa, Dakar for west and north Africa, and in Bogota for the Caribbean and Latin America. Nevertheless, among the more gratifying consequences has been

stimulation of greater cooperation among foresters in semi-arid Africa and the foundation of a germplasm bank in Zimbabwe to serve their individual and collective needs.

USAID

In a comprehensive report on Conserving Tropical Forests in Developing Countries submitted to the Congress of the United States in February 1987, USAID describes its support for tropical forestry. Briefly the following are the principal technical areas and the proportions as percentages of the total funds allocated to each of them.

	Percent
Agroforestry - stable and productive farming systems on cleared or degraded land.	21
Sustainable forest practices	21
Conservation of forest watersheds	13
Increased awareness of the value of tropical forests	13
Forest utilization and environmental protection	12
Traditional crop practices	09
Conservation of tropical forests	07
Conservation of biological diversity	04

The report also lists various functional areas to which additional funds are allocated. As of 1986 USAID was supporting 100 forestry projects, 19 new projects are planned and 36 are reported as completed. The report states that of the total life cost of projects

the proportion allocated to forestry is $491 M; that current annual funding for forestry is $53 M; and the projected level for 1988 is $65 M. Annual levels for the fiscal years 1984 and 1985 were each approximately $50 M. USAID expects to maintain support for tropical forestry at about $65 M annually for the foreseeable future.

The budget for forestry activities in 1987 is roughly $54 M of which roughly 47% is devoted to Asia and the Near East, 31% to Latin America and the Caribbean and 15% to Africa. By sector 39% goes to institution building, 24% to fuelwood and energy, and 19% to forest conservation.

Referring to its institution building, USAID gives weight to its concern for forestry research and education. In the matter of conservation it emphasizes efforts to decrease deforestation, desertification, land degradation, loss of biological diversity and promotes land use planning and sustained multiple use management. In its support for fuelwood projects it describes how the forestry/agriculture interface has been the locus of many successful interventions.

The report to Congress is recommended reading as much for its underlying philosophy as for the specific statements of support for tropical forestry.

Rockefeller Foundation

The RF support of forestry and agroforestry is said to be increasing and is predicted to level off at about $1 M/annum by 1988.

Ford Foundation

FF support for social forestry, agroforestry and related activities is described in detail in a report dated January 1987, a copy of which is with ICRAF's library.

The program covers a broad spectrum of activities in support of universities and rural development projects, the latter implemented by a variety of government, non-government and development agencies. The report begins with a review of the processes and consequences of deforestation and land degradation. It then addresses possible interventions and the political dimensions of land management. The interventions include social forestry, its essential modalities and constraints, and agroforestry which is described as a set of land-use technologies designed to improve the productivity of land resources, and defined to encompass any cropping system that incorporates trees or other woody perennials in spatial or temporal proximity to annual crops or livestock.

The FF investments by region from 1982 through 1986 are quoted as:

Asia	$6.7 M
Africa & the Middle East	1.6 M
Latin America and the Caribbean	1.8 M
TOTAL	10.1 M

FF classifies its activities in land management under five headings:

1. Strengthening NGOs
2. Reorientation of government bureaucracies
3. Management of common property resources
4. Support for human rights and social justice
5. Research and information dissemination

A survey of 82 FF forestry projects indicated 25% with NGOs, 24% with education and research institutes, and 18% with government agencies. The report states that support for the land management program "has grown dramatically over the last several years". Before 1980 cumulative expenditures totalled $484 K, since 1980 they exceed $16 M and continue in excess of $3 M per annum.

EUROPEAN ECONOMIC COMMUNITY (EEC)

EEC assistance to forestry is approximately $20 M/yr in support of some 40 major projects. Of the total, 54% is invested in Africa, 35% in Asia and the Pacific and 11% in Latin America and the

Caribbean. By sector, the lion's share (59%) goes to forestry and land use, forest industries receiving 21% and fuelwood for energy 11%.

The EEC report reveals that its support is largely for forestry components of integrated rural development projects, the main aim being to provide fuelwood, structural materials and fodder for livestock, together with soil and water conservation and general environmental protection. The industrial development sector includes traditional plantations for timber and other commercial products. Financing of fuelwood activities forms part of a larger more comprehensive program in energy generation and utilization. Recent EEC policy papers emphasize the importance of forestry in rural development and predict a continuing increasing investment in this sector.

U.K. OVERSEAS DEVELOPMENT ADMINISTRATION (ODA)

The U.K. ODA currently supports forestry activities in 20 countries: 8 in Africa, 7 in Asia and the Pacific, and 5 in the Caribbean and Latin America. All activities are directed to forest regeneration, forest management or conservation, approximately 55% being primarily social/community forestry and 45% industrial forestry. Almost all projects have a substantial research component and most include training. ODA support for forestry has more than doubled in the past 5 years.

IRELAND

Support for industrial forestry and forest product utilization have not featured in Irish development projects. The Government of Ireland is however supporting three projects in social forestry, one each in Lesotho, Sudan and Tanzania, the first being support for a seedling nursery for citrus, prunus and other fruit-bearing species. It is stated that "the importance of trees.....is increasingly recognized" and more forestry components will be included in the future aid program.

FEDERAL REPUBLIC OF GERMANY

The FRG agencies responsible provided several interesting and comprehensive publications all now deposited with the ICRAF library. Of particular interest is the GTZ brochure "Forestry and the Development of Rural Areas in Third World Countries". The principal objectives of the FRG program are development and improved use of tropical forest resources to support economic and social progress, particularly of rural populations. Particular emphasis is given to the conservation of ecologically valuable areas with special priority upon conservation of tropical rain forests. Africa is a priority continent, particularly those regions prone to desertification. Forestry development in mountain areas is also strongly supported.

Total investment in forestry activities appears to amount to approximately $34 M which, if the literature is correctly understood, represents about 10% of technical cooperation in the agriculture and rural development sector. Of the $34 M, 52% goes to Africa, 27.5% to Asia and the Pacific, 14% to Latin America and the Caribbean and 6.5% to the Near East.

The information received states that while FRG's total ODA is increasing at an annual rate of only 2-4%, disbursements in the forestry sector are rising at between 10 and 15% annually. In 1984 the combined investment for technical cooperation and financial cooperation in forestry amounted to $23 M and by 1986 this had increased to $39 M. It is assumed that this trend will continue and that the combined technical and financial components to forestry in 1988 will amount to $45 M.

NORWAY

The Norwegian Ministry of Development Cooperation supports projects in forest industries, catchment forestry, training and research in Tanzania, training and research in Zimbabwe and fuelwood plantations administered in Malawi for SADCC. New projects in Eastern and Southern Africa in catchment and village forestry are being planned. In addition forestry, particularly village forestry, is a

component of rural development programs in Botswana, Kenya, Tanzania and Sri Lanka. Total bilateral support for forestry is NK40M, roughly equal to $5.8 M USD. Norway also channels $4.0 M USD through FAO for support of forestry projects in Bhutan, Bolivia and Nepal.

The forestry sector is expected to increase in prominence during the coming years, particular attention being given to catchment and village forestry and to fuelwood.

SWEDEN

Our Swedish colleagues inform us that during the recent past roughly $2.3 M, about 7% of total budget, has been devoted to environmental research of which forestry has been a minor component. In the present year the Swedish government has allocated $15 M to environmental research roughly 50% of which will be invested in forestry projects specifically for studies of deforestation and desertification. It is anticipated that Swedish investment in forestry research in the Third World will be increased considerably in the future, special emphasis being upon total land use, agroforestry and social forestry.

SWISS DEVELOPMENT CORPORATION (SDC)

Forestry was a minor component of SDC's program until 1975 at which time there were only six projects at a total budgeted cost of SFr 5 M. During the periods 1976-1980 and 1981-1985 respectively 20 and 11 new projects were added. At present SDC supports 33 forestry projects and 7 in which forestry is a component of rural development. The recent average annual investment is SFr 25 M representing about 8% of total bilateral assistance. The budget for forestry in 1987 is SFr 80 M, 60% in Africa, 25% in Latin America and 15% in Asia.

The sectoral allocations are:

Rural afforestation	45%
Institute Building (largely education & training)	40%
Forest management (divided between industrial and conservation)	15%

Rural afforestation includes establishment of woodlots, shelterbelts and agroforestry systems. Ecological priorities are semi-arid and mountainous regions.

WORLD BANK (IBRD)

An IBRD review paper describes past experience with forestry projects between 1977 and 1986. It refers to the difficulty of defining criteria by which to judge overall performance, whether the right trees were grown in the right place, and who has benefitted from the projects financed. It emphasizes that forestry requires sustained support if meaningful conclusions are to be drawn. It will be several years before sufficient evaluation data are accumulated to determine "longer term impact" of social forestry investments.

The report lists eight countries in which forestry has been supported for more than a decade and nine for between 5 and 10 years. Of these 17, 10 are in Africa and 7 in Asia. Over the past decade Bank forestry lending averages less than 5% of total lending to agriculture; it was less than 2% in 1986. Considering the role of trees in stabilizing soil and water upon which agriculture depends, it is arguable that Bank investment in forestry should increase not decrease.

During 1967-76, 95% of the Bank's $115 M investment was on industrial forestry including logging, sawmills and plywood. Between 1977 and 1986 the total loans increased to $1.3 B of which 60% was for 69 social forestry, fuelwood and watershed protection projects.

The approximate percent proportions were as follows:

	PERCENT
Social forestry	28
Watershed protection	02
Forestry in agriculture and rural development	42
Logging and industrial plantations	20
Sawmills and plywood	08

The paper lists 10 key issues, inadequacies, defects and deficiencies, in Bank supported forestry projects. These include: inadequate attention to sociological aspects; and poor advance land use planning resulting in ecological degradation.

It describes the measures taken to redress these inadequacies in terms of: the influence of forestry on food production, economic analysis, sociological issues, cost recovery, institutional weaknesses, research, fuelwood, and land settlement.

The paper gives estimated rates of return from various categories of projects.

UNITED NATIONS DEVELOPMENT PROGRAM (UNDP)

From UNDP a long computer print-out lists by title all forestry projects financed over the past 25 years. Briefly, the data indicates the following allocations:

	TOTAL ($M US)	NO. OF PROJECTS
Africa	84.1	184
Asia and the Pacific	122.1	202
Arab States	19.9	59
Europe	8.9	41
Latin America and the Caribbean	53.5	98
GRAND TOTAL	288.8	591

Since only simple titles are provided it is difficult accurately to analyze allocations by sub-sector. Other print-outs suggest that in addition, some $16.5 M has been invested in 38 forest industry projects, $6.6 M in 3 cartography projects, $27.3 M in 30 land and water projects, and $1.1 M in one environmental health project.

ASIAN DEVELOPMENT BANK

Between 1977 and the end of 1986, ADB provided loan financing for 14 projects in 10 Asian countries for a total of $211 M. The loans were in the following percentage proportions.

	PERCENT
Timber extraction, sawmilling, processing	31
Plantation establishment	08
Fuelwood Plantation/Community forestry	34
Commercial plantation	12
Watershed management:vocational training	13
Forest industries/paper mill	02

Proposed projects call for loan financing of $298 M. In addition, over the past decade, ADB has invested $11 M in 34 technical assistance projects, and $5 M in forestry as a component of 9 other projects.

ADB is composing an updated Forestry Sector Policy paper including separate studies on forestry and forest industries to determine the Bank's opportunities for investment in forestry and forest industries.

INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT (IFAD)

IFAD reports that since its inception 19 of its projects, roughly 9% of total, contain a forestry component. The total cost of the forestry components is estimated at $63 M, IFAD's share being approximately $13.1 M. Of the projects referred to 7 were in Africa, 4 in Asia, 6 in Latin America and 2 in the Near East.

SUMMARY OF DONOR SUPPORT

It is difficult if not impossible to make an accurate assessment of total amounts allocated and overall donor investment trends in forestry programs. Some donors' support for forestry is included in

broader rural development programs and projects, the cost of the forestry component being not readily segregated. In general, however, an increased awareness of the importance of forestry is evident among donors and, in aggregate, support for forestry and agro-forestry appears to be growing at a faster rate than overall support for international development. This trend must surely be a source of encouragement to ICRAF both in terms of the future support it may anticipate and the influence the Council has clearly exerted upon donors' policies and priorities.

STRATEGIC PLANNING AND SOCIAL EQUITY

ICRAF's opportunities appear almost limitless. In light of other international research centre experience, the Council's options will be many and its choices difficult. Demand will inevitably exceed supply. Planned allocations will be tensed and stressed by the competitive priorities of those whom the Council seeks to serve and those who finance its activities. Its path is the more precarious in consequence of the complex and diverse factors which condition agroforestry systems.

The integration of forestry with farming, of sustainable systems of silviculture with crop cultivation, animal husbandry, land and water management demands strategic planning and resource management of

immense diversity and complexity. Complementary to the components of breeding, selection, cultivation and husbandry, reliable data bases are needed to feed complex computer models if agroforestry is to be comprehensively conceived and controlled.

There is however a potential pitfall to be anticipated and avoided. Those of us trained in the natural and physical sciences tend to think more of mathematically immaculate methodologies and innovative technologies and less of people. The impersonal vocabularies of economics, politics and industrial administration speak not of people but of human resources, numerical statistics to be crunched into computers along with such others as investment and working capital, taxes, tariffs and crop yields.

The recent Bellagio meeting pointed out that uncontrolled deforestation threatens the livelihood of 200 M people; that more than 1 billion people are suffering from shortages of fuelwood. At one of its earliest meetings ICRAF's Board of Trustees declared as a high priority: "The identification of socio-economic constraints to the implementation of agroforestry systems". The Asian Farming Systems Research Network, controlled and coordinated by IRRI, in which 12 Asian nations cooperate, clearly demonstrates the centrallity of people, the critical influence of human, social and cultural attitudes to the acceptance and adoption of technological change.

Among the basic principles for food and environmental security defined by the Food Security Advisory Panel to the Brundtland Commission the following quotation is of special significance:

> "Policies adopted by international and donor agencies, by national and local governments must be consistent with promoting people's participation in the formulation and implementation of development plans and of the advancement of a people based economic ecology movement."

In other words, those who pay the piper should not always call the tune.

Agroforestry is devoted to the study and conservative management of mankind's most precious inherited resource, its productive land. Destruction of that land and the biological systems it supports robs many poor people of their birthright. The extent to which ICRAF succeeds in reversing the degradation caused by human avarice, ignorance, stupidity and oppression of the poor will influence immensely the inheritance and quality of life of many future generations. It is an exciting and exacting challenge. Those who return in 1998 for the Council's coming-of-age celebration will, I am sure, be more than satisfied that the challenge was well met.